

The following is an excerpt from a paper by Bill Heinmiller, a physics teacher, about the use of journals to monitor his students' learning

Assessing Student Learning--and My Teaching--Through Student Journals

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Like many educators, I have tried a variety of methods in an attempt to more fully engage my students in the learning process. In my high school physics classes, I have had some measure of success through the use of inquiry-based laboratory activities, the infusion of technology into the learning process (computer and calculator-based labs, Internet use), cooperative learning strategies, and many other techniques.

However, I have always believed that I could be even more effective as a science teacher if I had a better understanding of what my students were thinking. I wanted to know students' perceptions--not only of the scientific concepts, but also of how I was teaching those concepts.

I have made great strides towards this goal through the use of student journals. Making a commitment to the journaling process has led to new challenges, it is true, but also new benefits.

The Challenges:

- **Stimulating Students to Think on Paper**

To get students started, I provide journal prompts on a weekly basis. In choosing the prompts, I try to offer a mixture of strategies. Some prompts are very specific to the content of physics:

- How can the coefficient of friction be determined by knowing only the angle of an inclined plane?
- Discuss the similarities and differences between gravitational, electric, and magnetic fields.
- Describe the concepts of sound as they relate to your favorite music.

Other prompts bring student attention to the process of learning physics:

- What are your goals and expectations for this course?
- What is your preferred learning style? What are the implications for this class?
- Reflect back upon your original goals and look ahead to what you would like to accomplish before the year is over.
- How has physics changed your world view?

The prompts illustrate my belief that, while physics is very important, it is more important that students develop an ability to think and develop strategies for learning, regardless of the content of a specific course. Any content area can be explored in student journals. To create good prompts, teachers simply need to choose questions that require students to generalize, draw comparisons, extend concepts, or explain an idea.

▪ **Finding Time to Provide Feedback**

Although the careful selection of prompts is quite important, I have found that my response to each student is even more critical. I take pride in the fact that I respond individually to each journal entry made by my students. My feeling is that if it is important enough for them to write about, it merits a response.

Through this process, I am able to establish a personal dialog with each student. This relationship motivates students to take the journals seriously.

I must admit that this practice is quite time-consuming. To justify the investment, the journals must offer many rewards for the educational process. I have found that the benefits of the dialog more than justify the investment of time, for teacher and students alike.

The Benefits:

❖ Gaining Insight into Student Thinking

The use of journals makes me aware of students' experiences and previously held misconceptions so that I can adapt instruction to best meet their needs. Early in the year, I use journals to find out as much about my students as possible. As the year progresses, I use journals at the beginning of each unit of study to find out what students know about a topic before I present any lessons.



Many times, students possess some very strongly held misconceptions about the physical world. These ideas can only be confronted if the teacher is aware of them. I have found that journaling is a very effective method for addressing this issue. For example, Joel (all student names have been changed) discusses how he would explain a friction and center of mass demonstration that causes one's hands to meet in the middle when they are slid along the bottom of a meter stick from opposite ends:

"Once again, physics baffles me. When I got home, I used one of my own meter sticks just to make sure you weren't using trick meter sticks. It obviously has something to do with friction, but with the friction we just learned, friction was related to acceleration and velocity. In this demo, friction doesn't seem to be related to either of these..."

This journal entry was very revealing to me. Even though it is not my intention, students are making generalizations about concepts based on the examples I use. Joel is making assumptions about friction, acceleration, and velocity based on his own limited experiences. This indicates to me that I must provide other learning opportunities that will allow Joel to generalize the concept beyond his understanding of a few specific examples.

❖ Challenging Students to Construct Concepts

The use of journals challenges students to construct concepts as they are developed in class. By carefully choosing the prompts to which they respond, I

challenge students to come to grips with what they know and how they understand it. Students are required to grapple with the many ideas floating around in their heads.

In this process, students are practicing self-assessment as they evaluate their own understanding of the physical world. This is depicted in the following entry written by Sandra regarding the motion of projectiles:

"...I know that they both should hit the ground at the same time but I can't understand why they do. The one is falling straight down and is accelerated by gravity and the other one is--
WAIT A MINUTE--I GET IT! THEY ARE BOTH BEING PULLED BY GRAVITY! THERE IS NO ACCELERATION HORIZONTALLY!
Now I understand! I guess it's not that difficult after all..."

When discussing the concept of relativistic time, Natalie wrote:

"I have to say that I've become confused and at the same time intrigued and completely fascinated by this concept of time....I had never thought of time as a fourth dimension but rather as a constant..."

Both of these entries exemplify the process of concept development by students. The key point is that the construction of knowledge is a process, and journals are an excellent medium through which this process can play out.

❖ Opening Lines of Communication

The use of journals opens the lines of communication between my students and me. This allows me to address their concerns as they arise and to receive continuous feedback from the people whose opinions matter most. For example, Kevin wrote:

"...I don't feel like I can do the problems, and I haven't felt like that for a long time....I'm not saying I don't think we should be challenged, but I think we should be given problems that at least give some hint as to what steps we should take in order to solve them. They just don't make sense!"

After reading this entry, I knew that something was missing from my instruction. Since Kevin was one of the very best problem solvers in the class, I knew he must be speaking for many students. I spent a day helping students solve the

problems, being careful not to solve the problems for them. Here is what Kevin wrote after that:

"I did this reflection yesterday [the one listed above] and today I was able to do the problems...Maybe that's why the problems are a challenge, they make you think. Anyway, I'm not angry anymore."

This example illustrates the importance of using journals as a forum to achieve an open line of communication. Rather than shutting down in his discouragement, Kevin was able to voice his concerns and ultimately realized the importance of problems that "make you think."

❖ An Ongoing Process

Through my experiences with journals, I have grown as an educator in ways that I never dreamed were possible. This form of student feedback has had a tremendous effect on what I teach and how I teach it. I feel I have an understanding of where my students are, where they would like to be, and how they plan to get there. With my comments, I am able to share with them my input in these areas as well.

Journals have enabled me to make assessment in my classroom an ongoing process where open dialog is encouraged, continuous feedback is expected, and individual ideas are valued and given an environment in which to grow. While I know I need to continue to improve my ability to provide genuine, authentic assessment opportunities for my students, I am on an enlightening journey and I am truly enjoying the ride!

Journals Foster Honest Communication

The following communication with "Tim" illustrates the importance of teacher-student communication that can occur within the journal.

Early in the school year as students are familiarizing themselves with the class, I give them opportunities to write about their thoughts regarding the course. Tim wrote:

To be honest with you, I have no idea what to write...I think the last two labs were pointless (not to sound rude or anything).....I wasn't really sure what to expect but this isn't it. I'm sorry if I came off the wrong way....please don't take this personally or anything like that. I'm a bit confused at the moment. I like your class and I like the way that you teach, but I just thought it would be different.

As you can imagine, this is not an easy message for a teacher to read. My first feeling was, "How can he possibly know what's best for him? I'm the teacher here!" However, I gathered thoughts, and then responded. This is a very important benefit of journals. They allow me to gather my thoughts rather than responding based on my first reaction. Here's part of what I wrote:

That's what I want to know. I'm glad you're honest. Stay that way! That's why I want you to write in your journal so I can find out what you're thinking...I guess I can't blame you for being a little confused right now--things are probably different from what you expected and from other classes you have had. I guess I'll have to ask you to trust me.....I really think you can do well, and I think it will be a class you can enjoy too. Thanks for letting me know what you think--I value your opinion.

The following week, at the end of another, content-related journal Tim wrote:

...I also would like to thank you for offering to help me, and I appreciate it a lot. I think I'm getting the hang of this lab and journal writing. But any tips or hints you can give me, I would

greatly appreciate it Mr. H.

As I look back on this dialog and the continued conversation that followed, I appreciate the journals even more. This is one example of how a student who was struggling with the direction and content of the course was able to communicate his concerns to me. Not only was I able to address many of his concerns, but I was also able to open a line of communication that enriched our daily, face-to-face interaction. I'm not sure that verbal interaction on a daily basis would have ever yielded such discussions without the journal.